

THE WHITE HOUSE
WASHINGTON

December 11, 1970


MEMORANDUM FOR

Dr. Henry A. Kissinger
Assistant to the President for National Security AffairsSubject: Use of High Altitude Aircraft for International Earth Survey
Missions

Use of U-2C and RB57F aircraft has been proposed for earth survey missions on an operational basis within the United States and possibly internationally, with U. S. sponsorship. Although the mode of operation has not been definitely fixed, it appears that the aircraft would be managed by a "lead" agency, such as the Department of the Interior, and operated by USAF crews in an arrangement similar to that presently in effect for NASA use of these aircraft.

The operation of these high altitude aircraft internationally for the collection of photographic data for civil use raises a number of questions that appear to be appropriate for review by your office, and particularly by the "40 Committee," before such a program can be implemented. In particular, it would be important to obtain a clear policy decision concerning civil use of these aircraft internationally and the conditions under which such use could be considered.

Attachment A is a more detailed outline of the background and content of the proposed high altitude aircraft program. Dr. Russell Drew of my staff will be available to discuss additional program details.


Edward E. David, Jr.
Science Adviser

Attachment

ATTACHMENT A

CHARACTERISTICS OF A HIGH ALTITUDE OPERATIONAL EARTH
OBSERVATIONS PROGRAM

GENERAL

U-2 and RB57F aircraft, anticipated to become available from DOD and capable of flying at altitudes of 60 - 70 thousand feet, provide an opportunity for extension of aircraft earth survey operations into this new high altitude regime. Interest in earth survey data is increasing both within the United States and internationally, and NASA has been pursuing an experimental satellite program and a research program utilizing these high altitude platforms as well as a number of others at low altitudes. With anticipated availability of a number of additional RB57F and U-2 aircraft from the DOD inventory, examination of their use in an operational mode for civil mapping, resource surveys, crop evaluation, land use planning and numerous other purposes, including similar use in other countries on a cost-reimbursable basis, appeared attractive enough to warrant additional study. The following information has been developed on this subject.

TECHNICAL FEASIBILITY

The United States has accumulated extensive experience with both the U-2 and the RB57F, operating within the United States and abroad. Both aircraft are reliable, suitable for a variety of sensors, and

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possess the necessary characteristics for an effective earth survey platform. The U-2 is single-piloted, while the RB57F carries a crew of two, one of whom could be a representative of the host government in areas where political sensitivities may require such action. Both aircraft require extensive logistics support at deployed locations, typically a single heavy logistics transport load, including special fuel, AGE, and environmental conditioning equipment. The U-2 can be operated from any airfield with reasonable surfacing and a minimum of about 6,000 feet length -- or, in general, any field capable of supporting commercial air carrier jet operations. The RB57F, while it can operate from similar fields, has an unusually wide wing span (122 feet) and wing tips that droop to within 18 inches of the ground. Therefore, for continued operations, it should be operated at fields with level runways wider than 150 feet (typical standard runway width), which will limit somewhat its flexibility for overseas use. Operational range of the RB57F is 2,400 miles, while typical maximum operating radius from a single base is 1,000 miles.

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Cost of operation for each aircraft will vary, depending upon the mode of operation that is employed. As outlined in Attachment B, there are at least three basic options for operation of the aircraft.

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Option I appears attractive for this program and would include USAF operation, maintenance and logistics support similar to the present arrangement with NASA for operation of the research aircraft complement. It may be possible to achieve savings in program costs by conducting both the operational and research aircraft programs from the same site. In this mode of operation, U-2 costs have been estimated at \$200 - \$400/flight hour, while RB57F costs would be 3 - 4 times higher. Cost estimates for mapping the United States utilizing the RB57F under similar conditions indicate that photography could be obtained at about \$1 per square mile -- a factor of 3 or 4 less than present costs for commercial aerial photography. It is clear, however, that additional cost data must be developed before accurate comparisons can be made between the two aircraft.

Use of the data for a variety of purposes can be anticipated. Mapping, however, is the principal verifiable short-term operational use to which these resources can be committed. Other uses can be envisioned, including geological surveys, water or other natural resource monitoring, crop survey, environmental and pollution monitoring. Many of these applications can be carried out in an ad hoc fashion in specific locations, but the majority of such earth

sensing activity would depend upon initial demonstration of capability, probably by the NASA research aircraft, and construction of a program to translate the properly collected data through a system for processing, analyzing, cataloging and storing the data and disseminating the data in a timely way to users for appropriate action. It is this latter post-collection phase that is least understood and which requires extensive further development. These portions of earth survey activity within the United States are poorly developed and therefore extension of this aircraft program to overseas locations should not be attempted before careful preparation and initial operational experience within the United States has been completed. Premature announcement of such a program could be a source of embarrassment to the United States if we are unable to achieve results that are comparable to our initial commitments. The mapping program appears to provide a framework within which other objectives can be explored, and appears to be the only demonstrated capability of universal interest that satisfies this criterion.

At present, the United States has in force cooperative mapping agreements with over 40 foreign governments, plus map exchange agreements with a number of additional countries. These agreements have established a precedent for mutual programming, sharing of work and end products, operation of ground survey teams in country and the country

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concerned. With restrictions upon DOD operations in this area because of funding limitations, it may be possible to transfer to this operational aircraft program for provision of a similar service, with the host country funding the cost of expendables such as film, fuel, processing costs and travel costs for crew and maintenance personnel. Guaranteed cost per flight hour would be a necessary component of such an arrangement.

POLITICAL ASPECTS

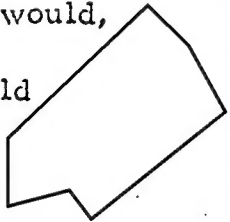
Experience with mapping agreements had demonstrated that many foreign governments are willing to permit U. S. aircraft to photograph portions of their country, provided data collection is in accordance with a mutually agreed program, with clearly identifiable end products of value to the host country. Concern over use of the U-2 in this role is likely, particularly in view of recent reactions to potential use of the U-2 in the Middle East.

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For this reason, although the U-2 is a perfectly acceptable platform technically -- and undoubtedly should be used in the United States -- use in overseas locations should be approached very carefully. Review by appropriate committees within the NSC structure should be carried out before such use is promoted with foreign governments.

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To ensure that aircraft used for earth surveys do not stray into forbidden areas, it will be necessary to provide adequate on-board navigation capability. The U-2 is already equipped with an adequate system, while the RB57F would require additional equipment costing about \$200,000 per aircraft. The RB57F would, however, permit foreign nationals to ride as observers should political sensitivities require such action. ILLEGIB



GOVERNMENT ORGANIZATION

Several agencies could act as the executive agent for such a program. The breadth of interest in earth surveys can be gauged by participation in planning for the ERTS program and existing programs involving use of aircraft for earth resources activity. Lead agency responsibility for a possible operational earth survey satellite system to follow ERTS has not yet been defined. NASA has played the lead role in developing the technology, defining the collection system and exploring the use of this data in a number of applications. The users -- principally Interior, Commerce and Agriculture -- have been carrying out similar pre-operational experiments and, in the case of Interior, have planned for an operational data handling and distribution role (Sioux Falls). Interior also has experience in processing high altitude photography into a useful end product -- in this case, map sheets.

The basic alternatives for management of the aircraft program
are:

- (1) Extend NASA management of existing similar aircraft resources to include additional aircraft devoted to an operational role. (This would require modification of the limitations on NASA management of operational programs.)
- (2) Assign management responsibility to a lead agency, preferably Interior or Commerce. The designated agency should be prepared to service other agency requests for data collection, as well as requests from State or regional authorities. Data would be supplied at cost, and it is possible that other Federal funds could support, in part, State and local collection efforts. The Department of the Interior has a stated requirement for mapping of the United States, using high altitude photography, which could provide the core effort around which the broader operational aircraft program could be constructed and for this reason appears to be the more desirable of the two agencies for a lead role. This may appear to prejudice the decision on lead responsibility for possible operational ERS satellite programs, but it would not foreclose an independent decision on management of the space segment.

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FUNDING

Assuming the need to begin such an operational aircraft program with a viable domestic component, additional funds will be required under either of the two alternative management approaches outlined above. It appears that the program would optimally include both types of aircraft, the U-2 and the RF57F, ^{no} providing flexibility in payload configuration and in operational characteristics to respond to either technical or political constraints. Conversion of the U-2 to earth survey use would depend upon cost of the sensor employed, ILLEGIE since very little aircraft modification is likely to be necessary (about \$35,000 per aircraft for hatch modifications). Additional costs will be incurred in restoring the U-2 aircraft to full flyable status from the present storage configuration.

For the RB57F (8 of which are likely to be available on long-term loan, if needed) no significant costs would be involved to restore the aircraft to flyable status, but it is likely that an externally mounted pod would be required to carry the sensor payload. NASA has developed such a pod, which is estimated to cost about \$1 million per aircraft. In addition, the RB57F requires an improved navigation system costing about \$200,000 per aircraft, and either aircraft will require additional cameras beyond the existing inventory. Thus ILLEGIE

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potential additional costs associated with data processing and distribution. Early and more precise definition of these costs should be a part of the detailed agency planning requested for this program.